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THE EARLY STAGES OF BRACHIOPODS. * — The final memoir on this subject, of which an abstract by the author is given on p. 385 vol. iii., of this journal, has at length appeared. After describing the different stages of *Terebratulina septentrionalis*, which are figured with many details on two excellent plates, Prof. Morse discusses the relations of Brachiopods with the Polyzoa, and in closing remarks as follows : —

“ With propriety may also be suggested a certain parallelism between the leading groups of the Polyzoa and the Brachiopods. We have forms like *Lepralia*, attached by one region of their shell, this shell being calcareous and exhibiting minute punctures, which have been compared to similar markings in certain Brachiopods. So among the latter group do we find forms attached, as in *Thecidium*, and some species of *Productus*; and generally the articulate Brachiopods might be compared to such forms as *Lepralia*, while on the other hand, such genera as *Pedicellina*, with its long, pliant and muscular stalk, or *Loxosoma*, with a stalk highly retractile, may be compared to *Lingula*. The limits or intentions of this paper will not allow any considerations regarding the relations of the Brachiopods with the other groups of the animal kingdom. I have elsewhere expressed my belief that they are true articulates, having nearer affinities with the Vermes; and in view of the above relations of the Brachiopods with the Polyzoa, it is interesting to remark that Leuckart has for a long time placed the Polyzoa with the Vermes, and in a new edition of the ‘*Outlines of Comparative Anatomy*’ Professor Carl Gegenbaur removes the Polyzoa from the Mollusca, and associates them with the Vermes.”

NATURAL HISTORY MISCELLANY.

BOTANY.

CROSS FERTILIZATION OF PLANTS. — Mr. Meehan exhibited some flowers of the common *Bouvardia leiantha* of the green-houses, and of the hardy *Deutzia gracilis*, and referred to his papers, published a few years ago in the “*Proceedings of the Academy*,” on practical diœcism in the trailing arbutus (*Epigæa repens*) and

* On the early stages of *Terebratulina septentrionalis*. By Edward S. Morse, Ph. D. (From the memoirs of the Boston Society of Natural History). Boston, 1871. 4to. pp. 10. With two plates.

Mitchella repens, in which he pointed out that these plants, though apparently hermaphrodite, had the stamens and pistils of different characters in separate plants, and were therefore subject to the laws of cross-fertilization as indicated by Darwin. He had had his attention called to the *Bouvardia*, by Mr. Tatnall of Wilmington, Del., as furnishing a similar instance to that of *Epigæa* and *Mitchella*, belonging to the same natural order in which the Cinchonaceous division of the Rubiaceæ, *Bouvardia*, was placed. These had some plants with the pistils exserted, while in others only the stamens were visible at the mouth of the corolla tube. Mr. Tatnall had not had the matter suggested to him early enough to say that it was so in all cases; but he believed that these flowers, which practically might be termed pistillate and staminate, were found entirely on separate plants. This is a very important fact, as *Bouvardia* is not raised from seeds in green-houses, but from cuttings of the roots, and therefore, all these plants with separate sexes must have been produced from one original individual, without the *intervention of seed*, and thus confirm the position advanced in a previous paper on "bud variations," namely, that variations in form, and, by logical inference, new species, may arise without seminal intervention; and that in this way identical species may appear in separated localities without the necessity of supposing an emigration from one small point, as Darwinism now does.

In the specimens of *Deutzia gracilis* were two forms of flowers on the same plant. Besides the large ones with stamens and pistils apparently perfect as generally seen, there were numerous small flowers in which the petals were only partially developed. The filaments were entirely wanting, but the anthers were as perfect, if not larger than in what we should call the perfect flowers. Any one could see that these small flowers were the result of deficient nutriment, and would be apt to pass the matter over with this simple reflection; but he wished to emphasize the fact that this defective nutrition rendered the female organs inoperative, while the male organs were still able to exercise their functions; thus affording another instance, if any more be needed, of the truth of his theory of sex, namely, that with defective nutrition, the female sex is the first to disappear; and that only under the highest conditions of vitality is the female sex formed.

In the case of the *Bouvardia* a similar law was seen. The

most vigorous stems, or, as they would be technically called, woody axes, produced the female flowers.

WOLFFIA BRAZILIENSIS IN MICHIGAN.—On June 25, 1871, I found the *Wolffia Braziliensis* Wedd. var. *borealis*, in the River Rouge, a tributary of the Detroit emptying a few miles below our city. The little plants grew rather sparingly with *W. Columbiana* Karsten, and *Lemna polyrrhiza* L. Though the *W. Columbiana*, in general its associate, has been found in the east, the *W. Braziliensis* has not, I believe, been met with there. For those not acquainted with it, I will state that it is easily distinguished from the former, even with the unassisted eye, by its subacute, oblong fronds, bright green and shining above, and pale beneath. It is further distinguished by being contracted or somewhat concave above, denser and less cellulose, by its more numerous stomata, and by being marked more or less with brown dots. It is also not so much submerged as the *W. Columbiana*, but floats on the surface of the water, the intensely green upper part lifted quite above it, bearing some resemblance to a little boat. Some botanists take the *Braziliensis* to be a form of the *W. arrhiza* of Europe.—HENRY GILLMAN, *Detroit, Michigan*.

ANTHERS OF *PARNASSIA*.—In the “Journal of the Linnæan Society,” vol. xi, Mr. A. W. Bennett published, two or three years ago, an interesting article upon *Parnassia*—its structure, affinities, and its mode of fertilization. I am now to remark only upon its anthers, which are generally described as *extrorse*. Mr. Bennett, observing that the present writer, in the “Genera of North American Plants Illustrated,” describes the anthers as *introrse*, and gives a drawing of *P. Caroliniana* as an illustration, proceeds to say: “I do not, however, find any other observer to agree with Prof. Gray’s observation in this respect, except two American botanists, Dr. Torrey and Mr. Chapman, who have probably borrowed their descriptions from him; nor do any specimens of this species which I have been able to examine confirm any departure in this respect from the ordinary type of the genus.”

It is easy to show that Dr. Torrey’s observation, at least, is independent and original. In his “Flora of Northern and Middle States,” published in 1824, p. 326, he described the anthers of *P. Caroliniana* as “incumbent;” in his “New York State Flora,” 1843,

as "fixed by the base, introrse." The first volume of the "Genera North American Illustrated" appeared in 1848. This season I have, for the first time, had the good fortune to see both *P. palustris* and *P. Caroliniana* in flower, in the Botanic Garden of Harvard University, the former blossoming at the beginning, the latter at the close of August. The difference between the two species "in this respect" is obvious.

In *P. palustris*, the anthers are certainly extrorse as to insertion; but the line of dehiscence lateral, with introrse rather than extrorse tendency.

In *P. Caroliniana*, the anthers are quite as much introrse as extrorse as to insertion, and truly introrse for dehiscence. A transverse section removes all doubt, showing the connective or solid part to be posterior, and the anther to be as truly introrse as possible.—A. GRAY, *American Journal of Science*.

GEOGRAPHICAL DISTRIBUTION OF SEA GRASSES.—Under this title, Dr. P. Ascherson gives an account, in a recent number of Petermann's "Geographische Mittheilungen," of the distribution of the species of flowering plants native to sea water. Of these he enumerates twenty-two, belonging to eight genera, and two natural orders. The area of each species is generally very limited, its distribution being mainly dependent on the present condition of the sea in which it is found, as to temperature, etc. Those which grow in temperate regions are frequently represented by closely allied species in tropical seas. Although the Isthmus of Suez is of comparatively recent geological date, the nine species found in the Red Sea are entirely distinct from the four species of the Mediterranean, and, with one exception, belong to different genera. A good map accompanies the paper.—A. W. B.

THE STRUCTURE OF BOG MOSSES.—Dr. R. Braithwaite, the highest authority in England on the mosses, has published in a recent number of the "Monthly Microscopical Journal," an account of the structure of the *Sphagninæ* or Bog-mosses. Dr. Braithwaite follows Schimper in considering them as a distinct order of the same rank as the true Mosses and Liverworts; the musical alliance being thus formed of the three orders *Bryinæ*, *Sphagninæ* and *Hepaticinæ*. The spore of the bog mosses does not, on germination, produce the much-branched confervoid pro-

thallium of mosses; but, if growing on wet peat, a lobed foliaceous production similar to one of the frondose Hepaticæ; if in water, the prothallium is a fine filament, the lower end of which forms roots, and the upper enlarges into a nodule, from which the young plant is developed. The male organs of *Sphagninæ* differ also from those of mosses, and, in the arrangement and form of the antheridia, resemble those of Hepaticæ. They are grouped in spikes at the tips of lateral branches, each of the imbricated perigonial leaves enclosing a single globose antheridium on a slender pedicel. Paraphyses surround them; but, instead of being simple, as in mosses, they are very long, much-branched, and of cobweb-like tenuity. The leaves of the bog mosses are very peculiar and form well-known and beautiful microscopic objects. They are remarkable from the cell-walls being perforated by holes, through which it is common to find that infusoria have passed, which may be seen sporting about in the cell-cavity.—A. W. B.

PELORIA IN LABIATÆ.—In a recent number of the “Sitzungsberichte der Kais. Kön. Akademie der Wissenschaften” of Vienna, Dr. J. Peyritsch records the continuation of his investigations of Peloria, or abnormal irregularity in the flowers of the Labiatæ. He finds the pelorial flower to be very commonly the terminal one in the inflorescence, the lateral ones being of the usual bilabiate type. The numbers of the parts of the calycine, corolline, and staminal whorls vary from two to six, the number being sometimes uniform throughout, and sometimes varying in each whorl; by far the most common arrangement being four of each. The pistil is usually quite regular, but in one instance the ovary was found to be six-lobed, surmounted by a single style and three stigmas. Examples of Peloria are recorded in the following species:—*Galeobdolon luteum*, *Lamium maculatum*, *Ballota nigra*, *Clinopodium vulgare* (one only), *Calamintha Nepeta*, *Micromeria rupestris*, *Nepeta Mussini*, *Nepeta Cataria*, and *Brunella vulgaris*. The abnormal development was found more frequently in plants grown in the Botanic Gardens than in the wild state. The paper is illustrated by several excellent lithographs.—A. W. B.

LEMNA TRISULCA IN FLOWER.—The flowering of the Cruciform *Lemna* (*Lemna trisulca* L.) is of such extremely rare occurrence, that my discovering it on Belle Isle, in the Detroit river, will be

deemed worthy of record. Floating on the surface of a small pond on this island, which is opposite the east end of our city, I found, on July 16, 1871, an abundance of the flowering *trisolca*, associated with *L. minor* L. and *L. polyrrhiza* L.; though the latter were greatly in the minority. I enclose specimens, from which will be perceived the remarkable difference of the plant from the usual submerged form. The flowering plant, it appears, is always of this small, compact, depauperate-looking type, and is provided with air-cavities which float it to the surface. The fronds are mostly proliferous from but one side, and the stalks are either much reduced or wanting, only five or six generations being connected; from which it would seem that this is a young state. I was not able to observe whether the posterior stamen opens later in the day than the anterior one, as Dr. Engelmann has surmised; but I found that a large number of the flowers had both stamens expanded at five o'clock, P. M. The exsert stamens were in such cases quite distinguishable by even the naked eye. Many of the plants were in bud, or about going to flower, having the anthers still enveloped in the spathe. I have collected a quantity of specimens which I shall be glad to distribute among my botanical friends. I hope to be able, at a later date, to secure the fruiting plant.

Last season (June 7, 1870) I discovered in the greatest abundance *L. minor* L. in full flower, at Eaton Rapids, Michigan, the locality so celebrated for its mineral springs. This plant also is rarely found flowering.—HENRY GILLMAN, *Detroit, Michigan*.

LEMNA POLYRRHIZA IN FLOWER.—I have to add to my former discoveries of flowering Lemnas, the finding of *Lemna polyrrhiza* L. in full blossom. I found it, July 30, 1871, at the west or opposite end of the same pond on the Belle Isle, in the Detroit River, Michigan, in which two weeks previously I collected the flowering *L. trisolca*. Here the *L. polyrrhiza* was largely in the majority, though growing with *L. minor* and *L. trisolca*; all three species being in flower together! At four o'clock, P. M., I observed many of the flowers of the three species with both stamens expanded. I was unable to reach the ground at an earlier hour. The analyzed flower exhibits two ovules. I enclose specimens. *L. polyrrhiza* was found in flower last year for the first time in America by Mr. Leggett of New York—and, I believe, the first time

anywhere for twenty or thirty years—at least the first time to give it a critical examination. The great rarity of the flowering of *L. polyrrhiza* is almost mysterious. Though I believe I have been enabled to throw some light on this matter, yet as I am not positive as to the correctness of my conclusions without further experiment, I refrain from printing them. — HENRY GILLMAN, *Detroit, Michigan.*

ZOOLOGY.

AQUARIA STUDIES.—At the outset of the present sketch we would premise that the glass side of our aquarium which is placed next to the wall, is never cleaned, and in consequence of this, it is soon covered over with a growth of what botanists call Confervæ. The Confervæ are among the lowest forms of Algæ, a group which contains a great number of very minute microscopic plants, which have been, of late years, specially studied by microscopists. Among the lower forms of these Protophytes are the Diatomaceæ, Desmidiæ and Volvocinæ, plants of very simple organization, only lately removed from the animal kingdom. Other orders are the Palmellaceæ, likewise plants of humble type; Ulvaceæ, plants of a rather more complex character; Oscillatoriaceæ, remarkable for a peculiar kind of motion; Nostochaceæ, Siphonaceæ, and Confervaceæ.

First let us scrape some of the growth off the glass at the back of the tank, then place it in the live box with a drop of water over it, and having adjusted our microscope, what do we see?

First of all notice the vegetation contained in this drop of water. That long pointed ribbon, having the green colouring matter twisting and curling through the centre, is one of the Confervæ, a species of *Spirogyra*, and close beside it there is another jointed species having the chlorophyll or colouring matter in patches; this is a variety of *Stigeoclonium*. These are purely vegetable, and are the resort of many little creatures which revel and hide themselves among their tiny clusters of bands.

The first intruder in the field of the microscope we would call attention to is that shapeless mass near the centre. It looks like a small piece of clear jelly with little black dots or granules within. But see, it has changed its shape: it is, as it were, running out; a finger-like process is flowing out here and there; the